

## TECHNICAL REPORT

### Botos are monitored as intervention strategies are outlined

*Record-breaking temperatures in Lake Tefé put the field team on alert*

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The monitoring team closely observes pink river dolphins (*Inia geoffrensis*) in the Papucu Cove, a critical area of Lake Tefé. Photo: Miguel Monteiro.

The Tefé Dolphins Emergency Operation, launched by the Chico Mendes Institute for Biodiversity Conservation (ICMBio), is focusing its activities on monitoring the pink river dolphins (*Inia geoffrensis*) and tucuxi dolphins (*Sotalia fluviatilis*) located in critical areas of Lake Tefé. The monitoring team is divided into two, conducting monitoring by boat and from fixed points on land, increasing both the reliability of observations and the chances of detecting any unusual behavior. In the event of spotting an individual displaying severe clinical signs, there is a rehabilitation facility set up to receive and treat these animals.



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On the morning of October 19th, a dead animal was identified, a young male pink river dolphin, still fresh, in the Papucu Cove region of Lake Tefé. The animal was sent for a necropsy, where various samples were collected to determine the cause of death. This new death occurred shortly after an extreme temperature event observed the previous day (18/10), where water temperatures above 38.8°C were recorded, reinforcing the hypothesis that water temperature plays a significant role in the deaths of these animals. A new metagenomic analysis for virome yielded results within the expected range, ruling out the hypothesis of active viral infection. The bacteriome analysis is still inconclusive.

Techniques for guiding groups of pink river dolphins and tucuxis out of critical areas are being tested by the field teams in case this strategy is to be implemented. Among these new methods of guiding the animals are "pingers," which emit a sound to deter cetacean species, and the Huki Lau, an adaptation from traditional Hawaiian knowledge resembling a curtain with objects to deter the approach of cetaceans. These are less invasive methodologies for guiding the animals. Nonetheless, the field team also tested the use of fishing nets to guide the pink river dolphins and tucuxis out of the Papucu Cove, a critical area in the mortality event of pink river dolphins and tucuxis, and successfully removed a significant number of individuals from inside. A barrier made of wooden stakes, called "pari," was also installed at one of the entrances to Papucu Cove to prevent the entry of animals.

Monitoring of the environmental characteristics of Lake Tefé has been ongoing, with an increase in temperature detected in recent days, reaching close to 39°C, and even reaching 40.9°C in a very shallow part of the lake where there were no dolphins or tucuxis. This measurement and the new death identified have put the team on high alert, as they continue to carefully monitor the population of pink river dolphins and tucuxis in Lake Tefé for any abnormalities.

### **Understanding the Case**

Since September 23, an unusual mortality event among pink river dolphins and tucuxis has been identified in the region of Lake Tefé, in the interior of Amazonas. A total of 154 individuals have died. The drought and water temperature, which reached 39.1°C at 4:00 PM on September 28, when 70 individuals died, are likely directly related to the event, although other causes of death have not been ruled out, such as water contamination or diseases in the animals. In addition to the high temperatures recorded in the lake during the afternoons, there is also a significant variation in water temperature throughout the day, ranging from 29°C to 38°C daily.



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As of now, the recorded results include 154 dead dolphins, with 131 pink river dolphins and 23 tucuxis. Out of this total, 122 animals have undergone necropsies and their tissue and organ samples have been sent to various specialized laboratories across Brazil. Seventeen individuals have been evaluated with histological analyses, and so far, there is no indication of an infectious agent as the primary cause of mortality. Molecular diagnosis (PCR) of 18 individuals has also yielded negative results for infectious agents, including *Morbillivirus*, *Toxoplasma*, *Clostridium*, *Mycobacterium*, and Pan-fungus, associated with mass deaths.

The Tefé Dolphins Emergency Operation has been divided into three main sectors: Live Operation, Dead Animal Monitoring Operation, and Environmental Monitoring. The Live Operation sector aims to monitor groups of pink river dolphins and tucuxis along Lake Tefé. In case an individual displays signs of abnormality, they have the capacity to rescue and send it to the Rehabilitation Floating Station for monitoring, possible treatment, and intervention. So far, no animals have been rescued. The Dead Animal Monitoring Operation sector aims to identify and retrieve carcasses in the region and conduct necropsies to collect samples for laboratory analysis (histopathology, infectious disease research, toxic elements, biotoxins, etc.).

The Environmental Monitoring sector consists of three monitoring fronts: Water, Fish, and Phytoplankton. Out of all the environmental and biological variables analyzed, the only one showing abnormal behavior is water temperature. The fish mortality found is normal for events of extreme drought in the region. The phytoplankton team has been monitoring the lake and identified the species of phytoplankton in the Papucu Cove, Lake Tefé. A proliferation of the algae *Euglena sanguinea* has been observed since October 3. Despite its potential ichthyotoxicity, i.e., the ability to cause fish mortality, there is currently no evidence that its toxin is related to dolphin mortality or that it has caused fish deaths in Lake Tefé.

The Tefé Dolphins Emergency Operation was initiated by ICMBio with technical support from the Mamirauá Institute. Various institutions are participating in the operation: Aiuká Consultoria em Soluções Ambientais, Aqua Viridi, Aquasis, Azul, Corpo de Bombeiros de Tefé, CRMV/AM, European Association for Aquatic Mammals, Exército Brasileiro, Friends of Nuremberg Zoo Association, Fundação Mamíferos Aquáticos, Fundación Mundo Marino, GRAD - Grupo de Resgate de Animais em Desastres, Greenpeace, IBAMA, INPA, Instituto Aqualie, Instituto Baleia Jubarte, Instituto Oswaldo Cruz (IOC/Fiocruz), International Fund for Animal Welfare, IPAAM, Lapcom-USP, LATAM, Loro Parque Fundación, Marinha do Brasil, National Marine Mammal Foundation, Nuremberg Zoo, Oceanogràfic València, Planète Sauvage, Polícia Militar do Amazonas,



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Prefeitura de Tefé, R3 Animal, Rancho Texas, Sea Shepherd Brasil, Sea Shepherd France, SeaWorld & Busch Gardens Conservation Fund, SEMMAC-Tefé, Universidad de Las Palmas de Gran Canaria, Voepass, WWF-Alemanha, WWF-Brasil, YAQU PACHA e Zoomarine Portugal.